



ONTARIO POWER AUTHORITY



Presentation to Growing the Margins

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Overview

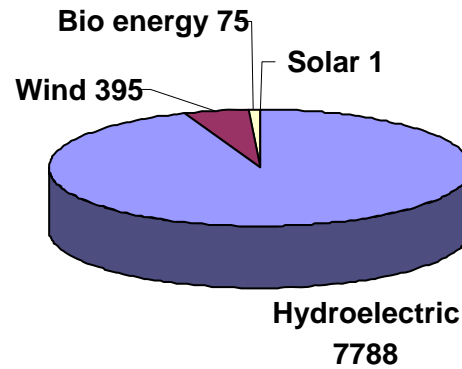
- OPA's Integrated Power System Planning (IPSP)
- Renewable Energy Standard Offer Program (RESOP) Update
- Solar Photovoltaic (PV) Projects
- Biomass Projects
- Wind Projects
- Issues

Government Directives

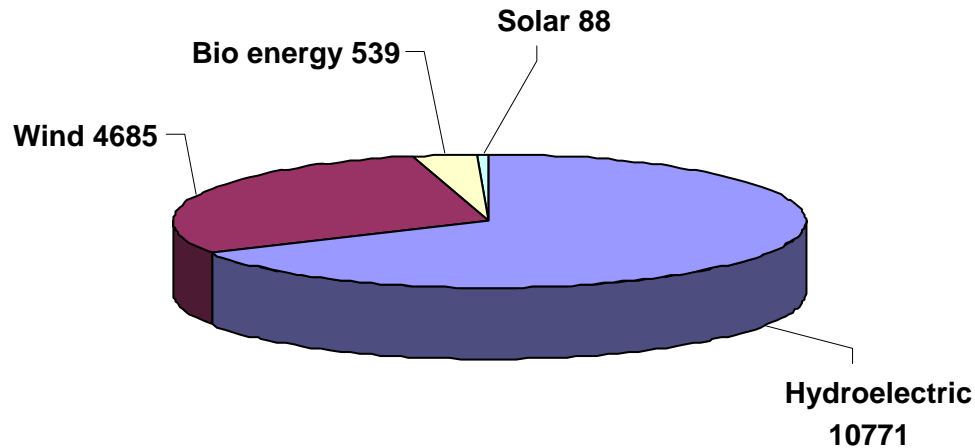
- Supply mix directed by the Ontario Government
 - 6000 MW Conservation (\$10 billion investment)
 - Double renewable energy from 8000 MW
 - Expand transmission to enable new sources
 - Phase out coal and limit nuclear

Renewables Targets (by Government)

Renewable Resources in 2007 (MW)



Renewable Resources in 2027 (MW)



OPA's Integrated Power System Planning (IPSP)

- Ontario's 20 year generation and transmission plan
- The Plan:
 - Recommends infrastructure development, and procurement processes
 - Engaged the public interest in electricity through open processes
 - Becomes a reference to evaluate future options
 - Enables implementation to achieve policy priorities
 - Will be updated in three years

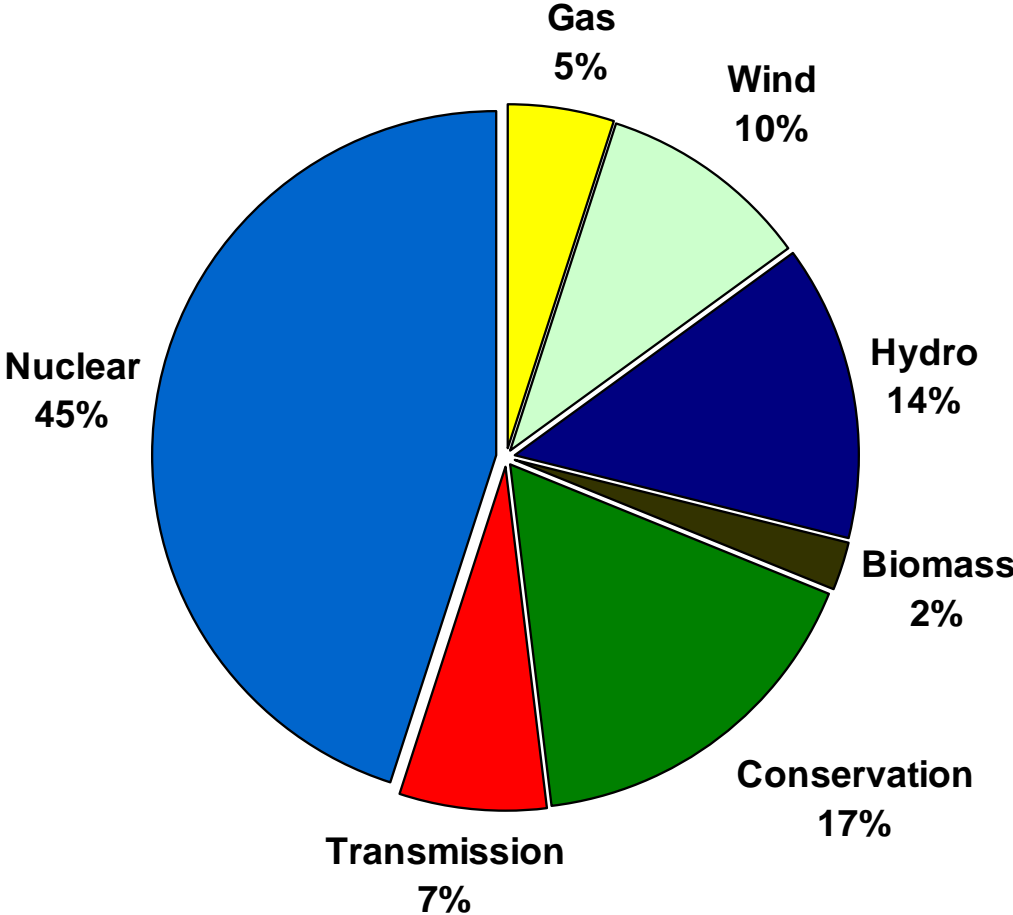
The infrastructure plan shows how to implement policy priorities

- Maximize feasible cost-effective conservation
- Maximize feasible cost-effective renewables
- Meet remaining baseload needs through refurbishment and new build of nuclear capability
- Replace coal by cleaner committed and planned new resources,
- Plan transmission for reliability, incorporation of generation, and system efficiency

Current Status of IPSP

- The IPSP is the product of over two years of consultation and planning. It started with public consultations in the fall of 2005 and is now heading for regulatory review at the OEB.
- Scope of OEB review:
 - Compliance with supply mix directive
 - Whether plan is economically prudent and cost effective

Cost of Planned Resources: \$60 Billion



2007 \$ Billions	
Conservation	10.2
Transmission	4.0
Nuclear	26.5
Gas	3.6
Wind	6.0
Hydro	8.4
Biomass	1.0
Total	59.7

IPSP – Customer Based Generation

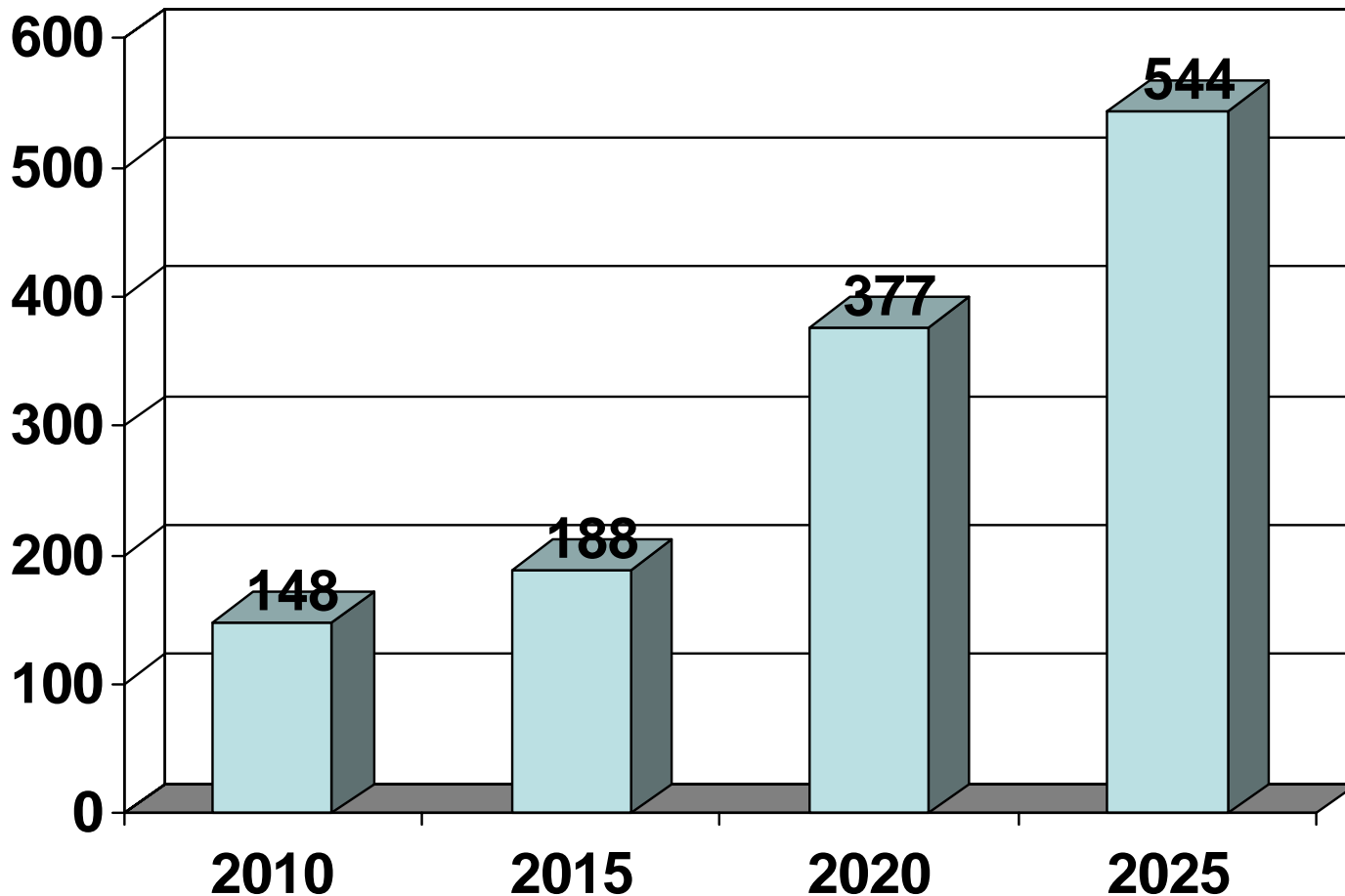
IPSP defines customer-based generation as:

- 10 MW or less for co-generation projects
- 500 kW or less for renewable energy projects

Savings potential was established in recognition of the two Standard Offer procurement initiatives, the Renewable Energy Standard Offer Program and the Clean Energy Standard Offer Program.

IPSP – Customer Based Generation

Proposed Savings Potential on System Peak for Customer-Based Generation (MW)



Data Extracted From: IPSP, Exhibit D, Tab 4, Schedule 1, Attachment 4, Page 3 of 9

- **Cogeneration proposed resources consist of:**
 - 50% district energy CHP resources and,
 - 50% industrial/agricultural resources
- **Renewable resources consist of:**
 - Biomass, photovoltaic and wind
 - Biomass consists of: 25% landfill gas, 25% biomass and 50% wastewater biogas

IPSP – Renewable Targets

	MW
Hydroelectric	10,771
Existing	7,788
Committed	62
Planned	2,921
Wind Power	4,685
Existing	395
Committed	1,251
Planned	3,039
Bioenergy	539
Existing	75
Committed	14
Planned	450
Solar	88
Existing	-
Committed/Planned	88
Total Renewable Resources	16,083

Specific Targets

- Small-Scale Project Contributions by 2027
 - Solar: 88 MW
 - Bioenergy: 450 MW (large and small)
 - Hydroelectric: 2,921 MW (large and small)
 - Small Wind: 1,148 MW

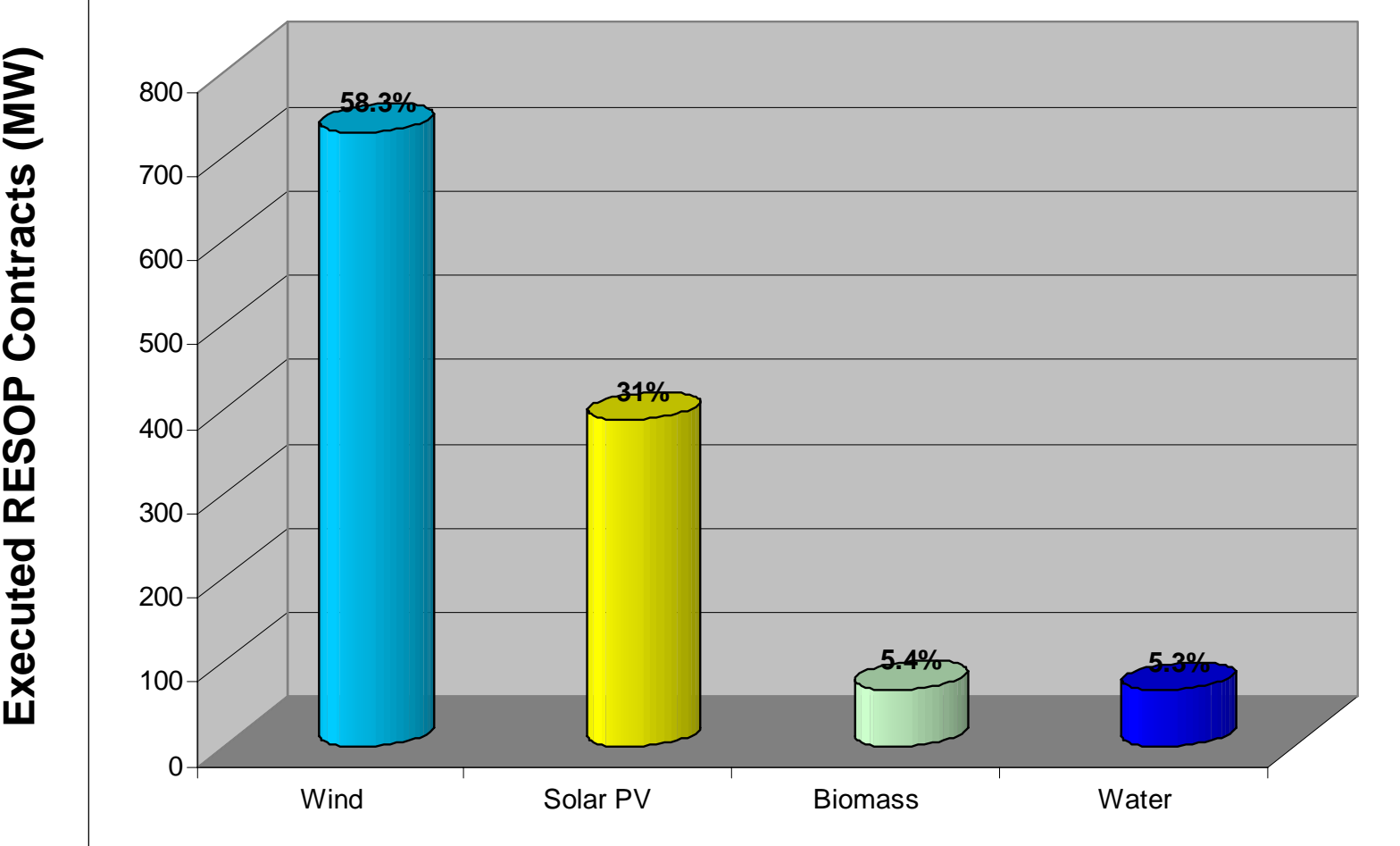
The Renewable Energy Standard Offer Program

RESOP:

- Launched November 2006
- Biomass, Wind, Solar and Waterpower Projects
- Balance renewable targets with value of electricity to ratepayers

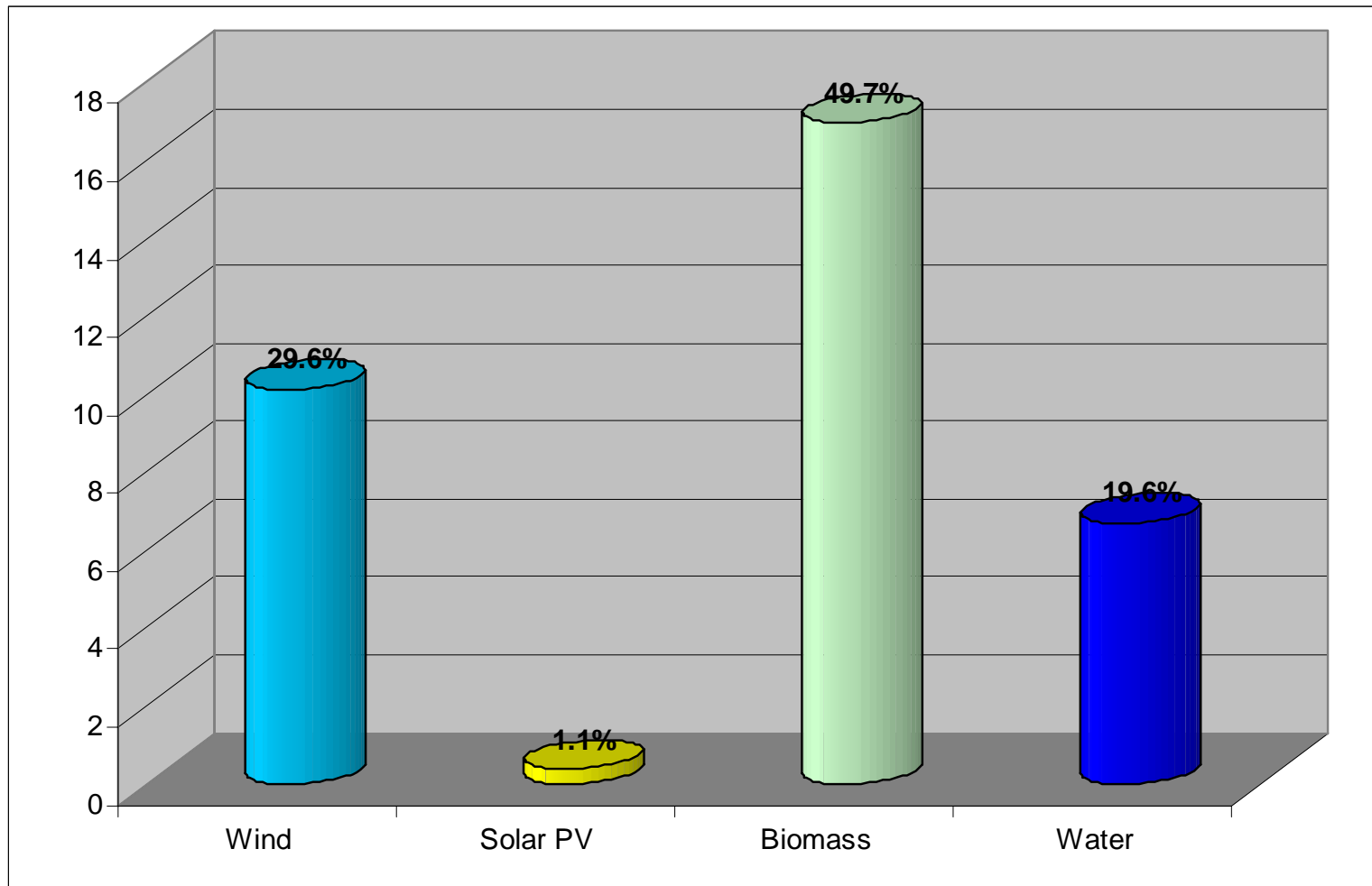
- To date:
 - 299 Contracts executed
 - Approximately 1,250 MW under contract

Total Contracted Capacity of RESOP Contracts per Fuel Source (To Date)



Total Capacity of RESOP Contracts in Commercial Operation per Fuel Source (To Date)

RESOP Contracts Reaching Commercial Operation (MW)



Program Payments:

- Wind, Biomass and Waterpower @ \$0.11 / kWh
- On-Peak performance \$0.0352 / kWh
 - Available for biomass and waterpower
- Payments for Solar PV @ \$0.42 / kWh
 - Not eligible for inflation increases or on-peak performance
 - Price discovery

RESOP - Application Requirements by the OPA

- Copy of completed **Connection Impact Assessment (CIA)**
 - CIA not required for ≤ 10 kW, though micro-generator must still meet LDC connection requirements.
 - Expedited connection process for ≤ 10 kW as per process established by Electrical Safety Authority (ESA)
- **Environmental Assessment** commenced (if required by regulation – n/a for renewable Gx of ≤ 10 kW)
- **Demonstrated Site Access**
- **Authorization Letter** for the LDC to release information relating to the Applicant to the OPA
- Generator must obtain all relevant permits, licenses, etc.

RESOP Connection and Metering Requirements

- Generator must connect to an eligible distribution system via a single connection at a voltage of 50 kilovolts (kV) or less. (RESOP not for off-grid generators)
- The generator will be solely responsible for any costs associated with this connection and the related metering.
- Connection queue is first come first served, so some projects are unable to connect
- OEB undertaking review of transmission and distribution connection cost responsibility

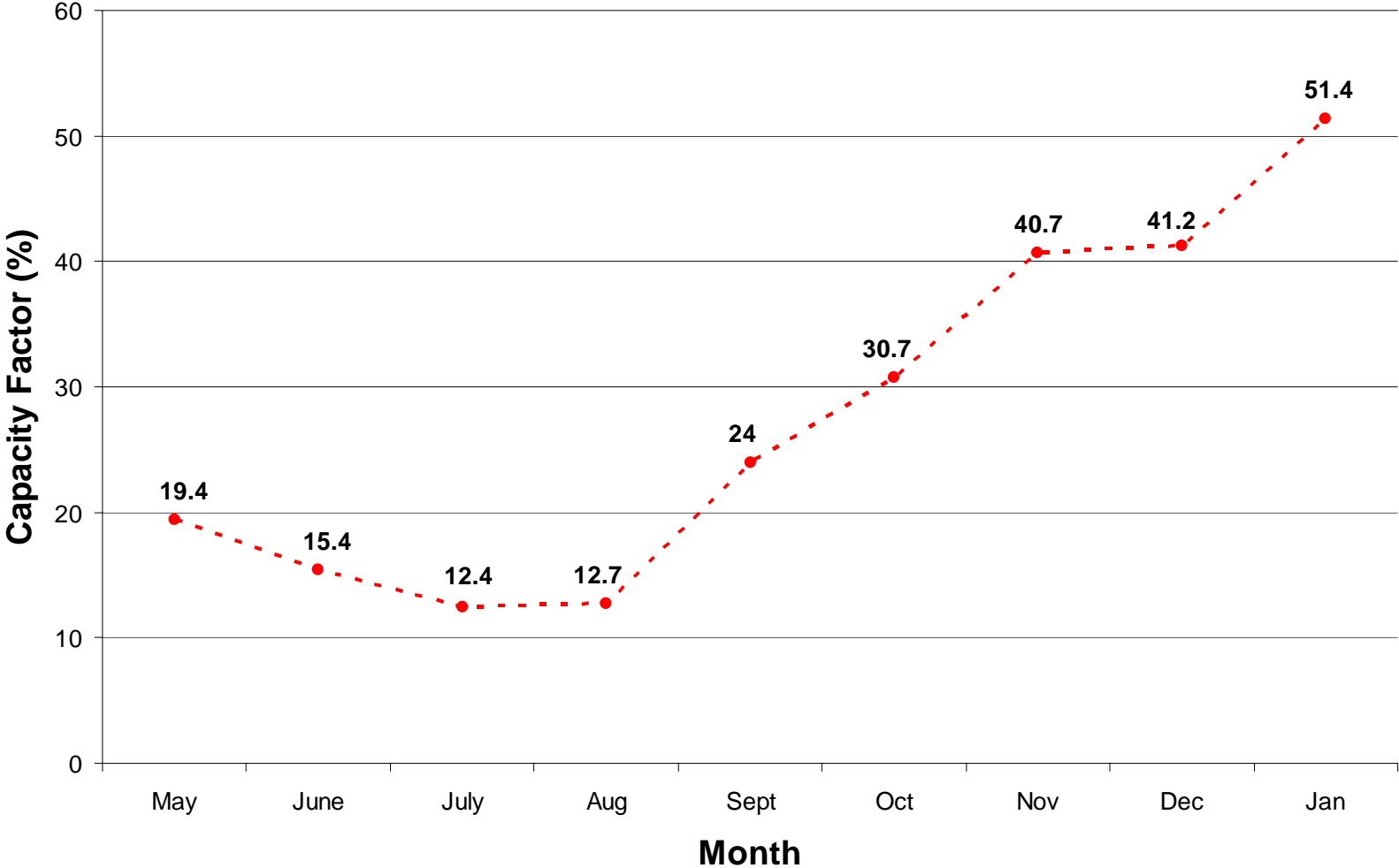
Wind on Farms

- There are opportunities for Farmers to earn revenue from allowing wind powered generating stations (turbines) on their property.
- Some suggestions regarding Wind Power Leases for Farmers include:
 - Meet with your neighbours (NIMBY)
 - Explicitly outline the area where a turbine can be placed
 - Evaluate your options:
 - consider your choices (either developing with this partner or having your own wind project) and choose the best situation for your farm
 - % of project revenue vs. fixed \$ / year

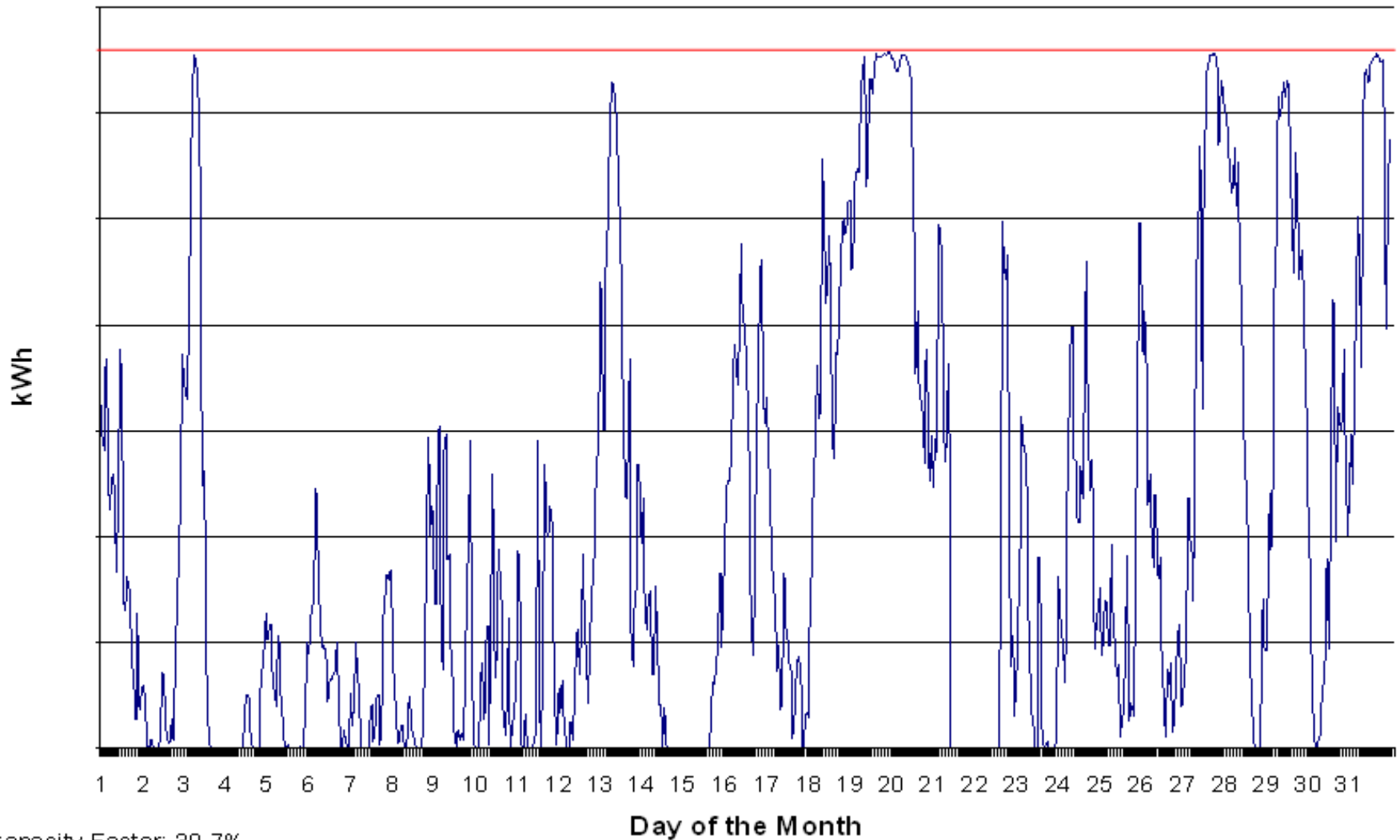
Additional Suggestions can be found at:

http://www.ofa.on.ca/templates/popup_frset.asp?FileName=../policyissues/factsheets/WindPowerLease.htm

Monthly Capacity Factor for Typical Wind Project



Typical Monthly Wind Generation Data



Capacity Factor: 30.7%

October 2007

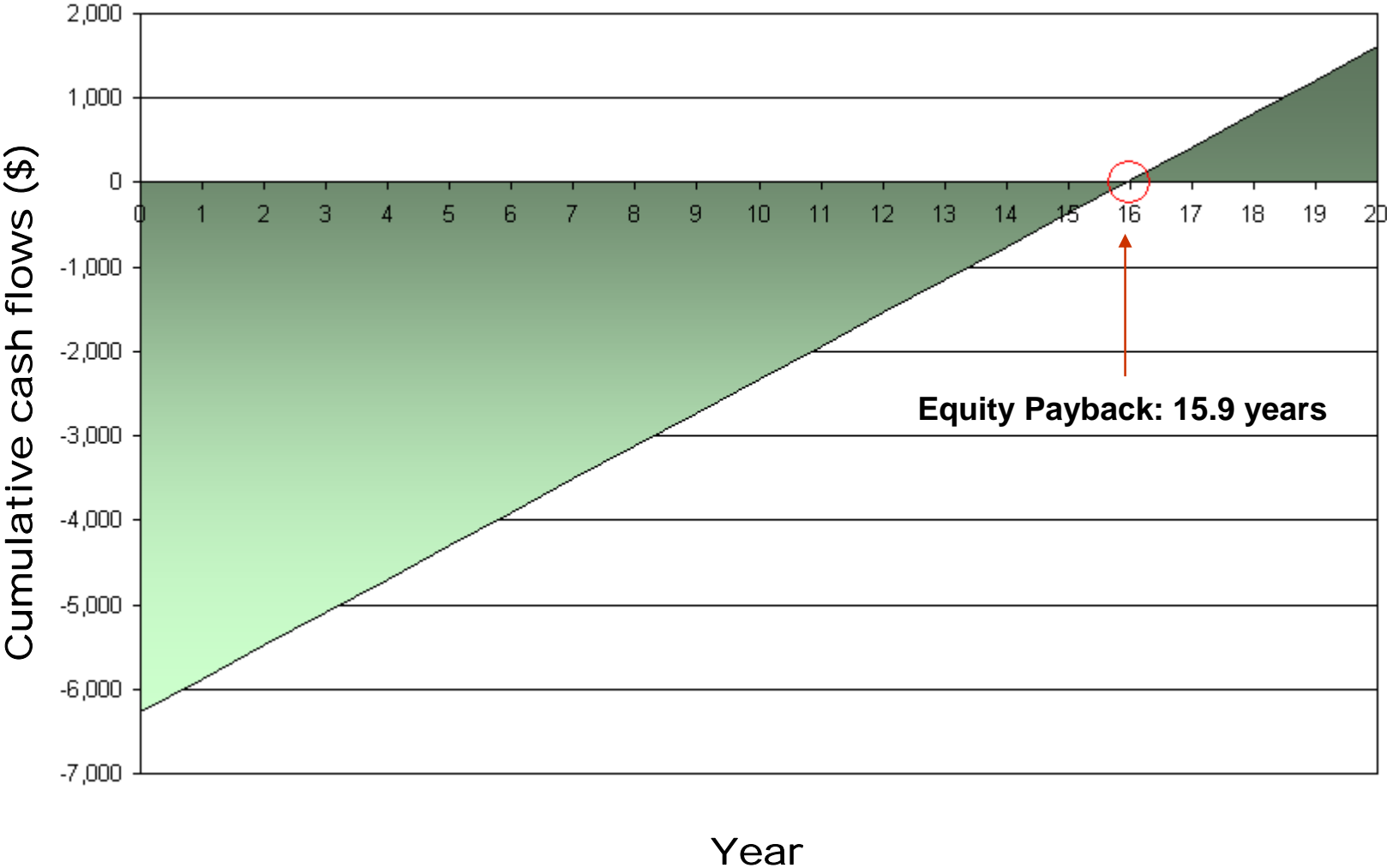
Typical Farm-Based Solar PV Project

- Fuel: The Sun
- Project Size: 3.4 kW
- Capacity factor: 16.5%

Solar PV Project cont'd

- Inputs:
 - Capital Cost: \$32,000
- Assuming:
 - 2% inflation
 - 9% discount rate
 - Class 43 tax treatment
 - allows for 50% tax write-off of capital costs each year, on a declining balance

Solar PV Project - Cumulative Cash Flows



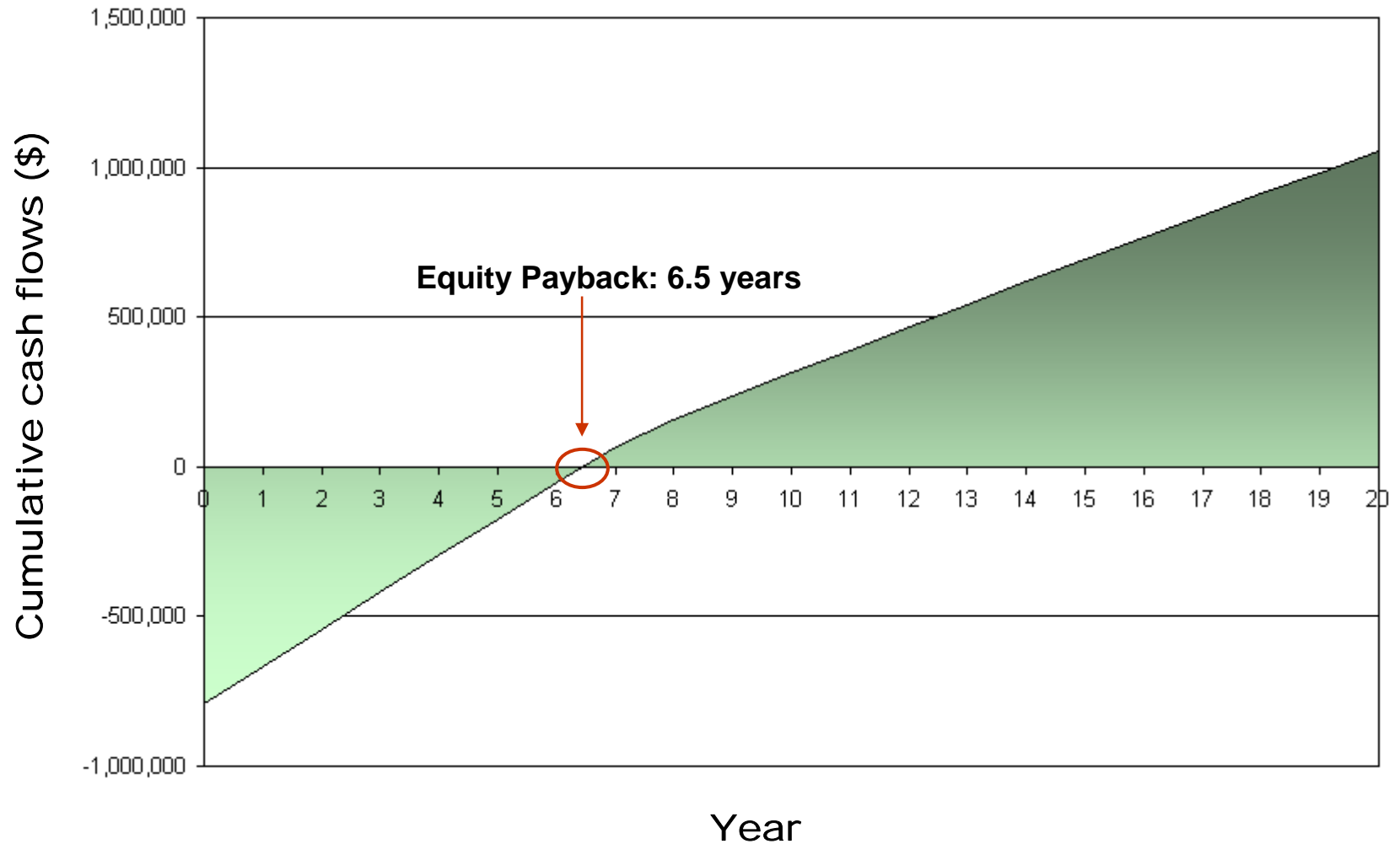
Typical Farm-Based Biogas Project

- Fuel: Farm inputs
 - Manure
 - Corn-silage
 - Other organic materials
- Engine Size: 200 kW
- Capacity factor: 90%
 - Assuming off-line time for routine maintenance

Biogas Project cont'd

- Inputs:
 - Capital Cost: \$900,000
 - Grants/Incentives: \$170,000
 - Annual O&M: \$63,072 (4¢/kWh)
- Assuming:
 - 2% inflation
 - 9% discount rate
 - Class 43 tax treatment
 - allows for 50% tax write-off of capital costs each year, on a declining balance

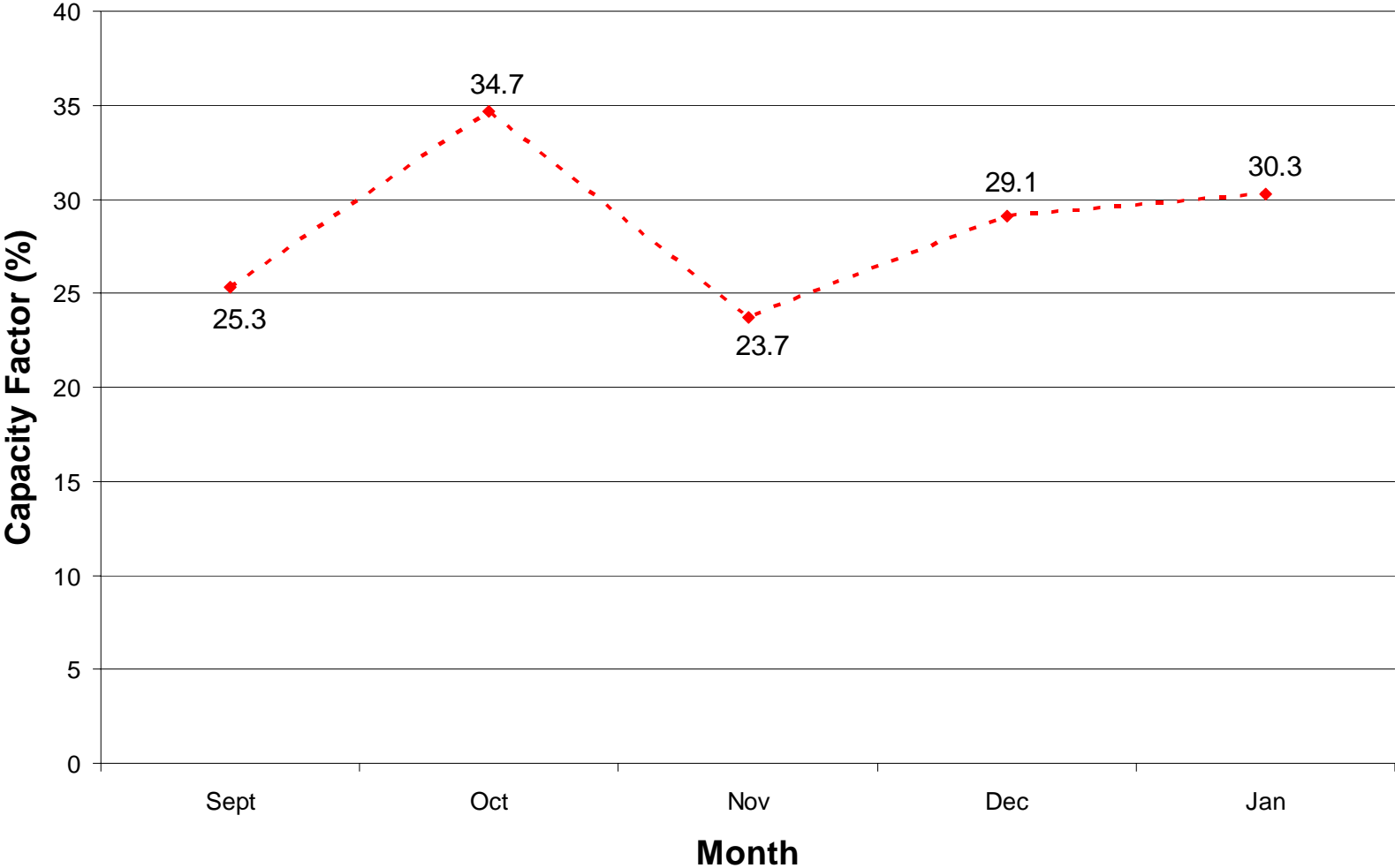
Biogas Project - Cumulative Cash Flows



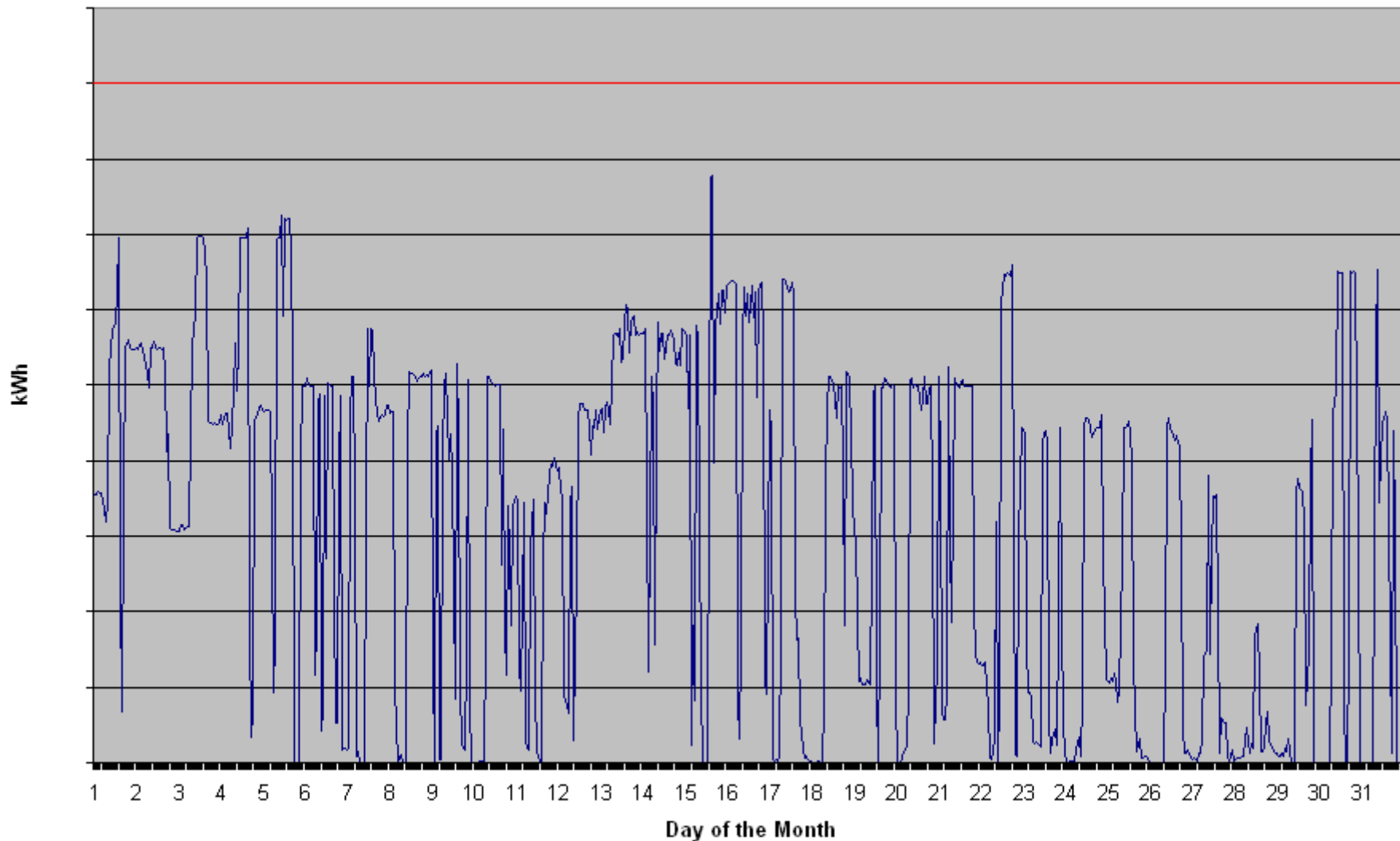
Incentive: \$170,000 or 19%

Compare: Without the incentives, equity payback= 7.5 years

Monthly Capacity Factor for Typical Biogas Project



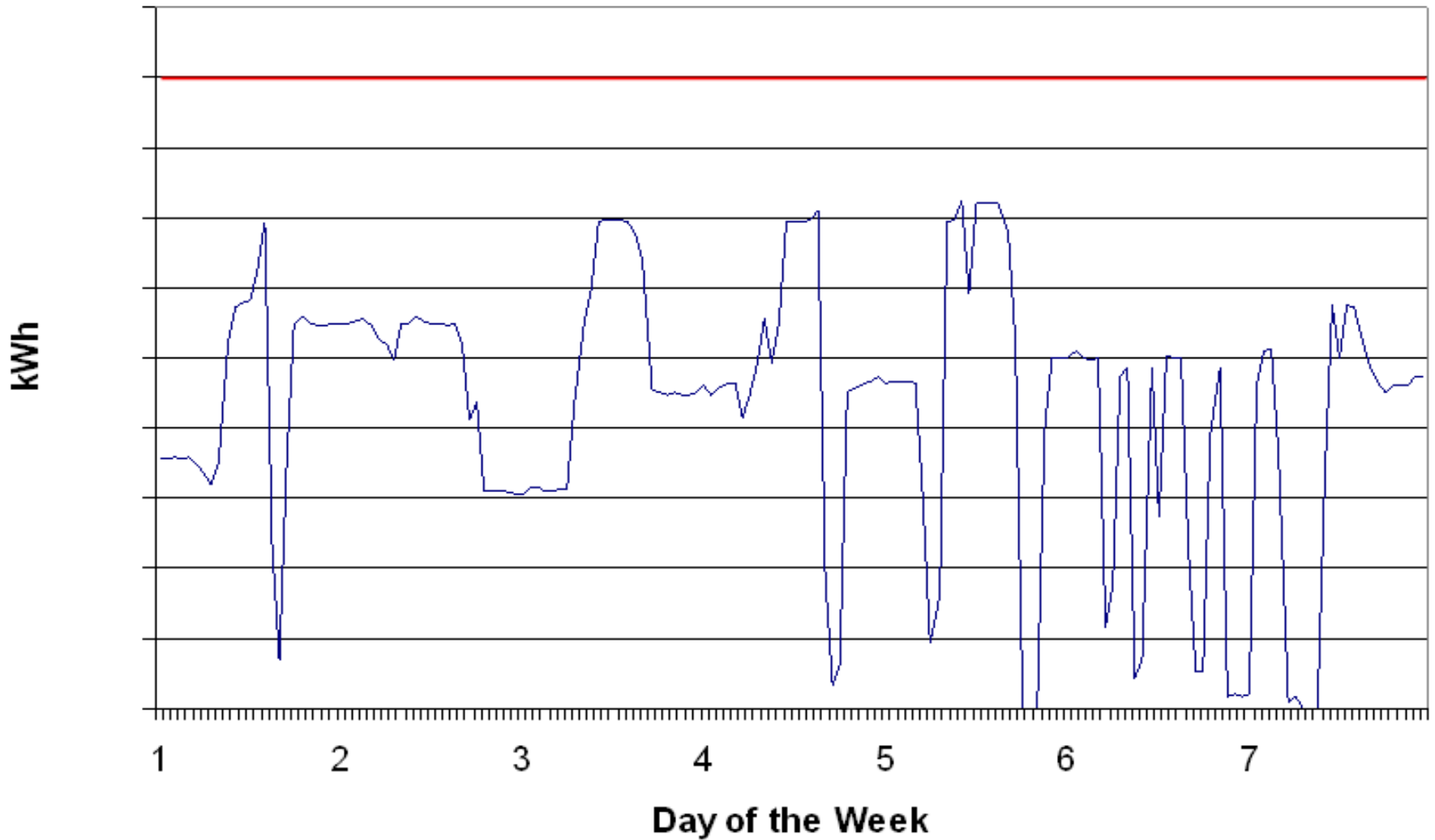
Typical Monthly Biogas Generation Data



Capacity Factor: 34.7%

October 2007

Typical Weekly Biogas Generation Data



RESOP Issues

- Distribution system access and queue position
- Transmission system limitations
 - Amount of distributed generation needs to integrate with system operations at distribution **and** transmission levels
 - Multiple, simultaneous procurements require better coordination (RESOP, RES, CESOP, CHP II)
- OPA working with IESO, distributors and other stakeholders to identify any issues proactively

Next Steps

- Two–year review to be commenced in Fall 2008, as per program design
- Feedback received will be incorporated into review
- Interested Stakeholders are encouraged to subscribe to the RESOP email list and participate in the webcasts

For Additional Information

- OPA Standard Offer Program Website: www.powerauthority.on.ca/sop
- OEB Website: <http://www.oeb.gov.on.ca> for more information on connections and queuing
- Questions?